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# SECTION TWO – MIOSHA REGULATIONS

## PART 2: MIOSHA Health Regulations

### CHAPTER 14: Air Contaminants

**T**he *Air Contaminant Rules* of the *MIOSHA General Industry Occupational Health Standards* are administered by the Michigan Department of Consumer and Industry Services (CIS), Bureau of Safety and Regulation, Occupational Health Division. The air contaminant rules set permissible exposure limits for approximately 600 substances. While the most important permissible exposure limits for printes are those for solvents, many other substances used in the printing process are also included. Permissible exposure limits set by these rules include:

- The time-weighted average (TWA) which represents the employee's average airborne exposure in any eight-hour work shift of any 40-hour work week which and shall not be exceeded.
- The short-term exposure limit (STEL) which represents the employee's 15-minute TWA exposure which shall not be exceeded at any time during a work day unless another time limit is specified for the contaminant.
- A ceiling limit is the employee's exposure which shall not be exceeded during any part of the work day. If instantaneous monitoring is not feasible, the ceiling shall be assessed as a 15-minute, TWA exposure which shall not be exceeded during any part of the work day.

Permissible exposure limits for some typical printing compounds are as follows:

Acetone .....	750 ppm	Toluene .....	100 ppm
2-butoxyethanol .....	25 ppm	.....	150 (STEL)
Isopropyl alcohol .....	400 ppm	1,1,1-Trichloroethane .....	350 ppm
(Isopropanol) .....	500 ppm (STEL)	.....	450 ppm (STEL)
Stoddard Solvent .....	100 ppm	Xylene .....	100 ppm
.....		.....	150 ppm (STEL)

#### 14.1 Employee Exposure

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As an employer who uses hazardous chemicals in the work place, you should evaluate your employees' potential exposure to these chemicals. Key elements of a hazard evaluation will provide you with the knowledge to determine what materials must be monitored for exposure purposes. (This evaluation may be coordinated with your facility's pollution prevention efforts.) Steps that should be considered in the evaluation include:

- Determining the physical, chemical, and toxicological properties of the hazardous material;
- Quantifying the amount of product that is used and the rate at which gases or vapors are generated;
- Determining the length of exposure;
- Considering the decomposition of products and other types of hazards such as skin absorption or ingestion;
- Evaluating the location of the hazard and existing engineering controls; and
- Seasonal considerations. Volatile compounds will produce more vapors as the temperature of the work place increases during summer months. Dilution ventilation during cold months typically decreases as buildings are closed up to minimize heat loss.

### 14.2 Monitoring

The best method of evaluating your employee exposure to hazardous chemicals is achieved by conducting personal monitoring. Personal monitoring means the sample is collected as close as possible to the exposed employee's nose and mouth.

Area monitoring (collecting the sample from an area of the plant where employees are exposed to hazardous chemicals) can be conducted in some circumstances to provide general information pertaining to the likelihood of overexposure of employees to regulated permissible exposure limits. However, area monitoring can produce inaccurate results if the sample is not collected from a proper location.

Monitoring of air contaminants can be conducted in a variety of ways. These include:

- Use of direct reading instruments which provides instantaneous or continuous analytical results.
- Use of personal monitoring devices which are either passive or active. Active devices utilize a pump to draw air through some type of collection media. The collection media is then sent to a laboratory for analysis. There are specific, recognized procedures for collection and analysis of air contaminants which must be followed to ensure reporting of accurate results.
- Use of detector tubes, which are a type of passive or active monitoring device that provide inexpensive, quick, and relatively accurate analysis of contaminant levels in the work place.

The CIS, Consultation Education and Training (CET) Division, provides professional, on-site assistance, free of charge, to aid small printing establishments in evaluating employee exposure to air contaminants (see Where To Go For Help in the MIOSHA Overview).

### 14.3 Engineering Controls

When employee exposures to an air contaminant exceed the permissible exposure limit, the employer must institute available and feasible (i.e., economically, structurally, etc.) engineering controls to reduce exposures below the permissible exposure limit. If exposures cannot be reduced below the permissible exposure limit, engineering controls must still be used to attain the lowest exposure levels feasible. Types of engineering controls may include:

- Bringing in large volumes of fresh air to dilute the concentrations of hazardous material, referred to as dilution ventilation;
- Use of local exhaust ventilation to capture and remove the hazardous material at its point of emission or source. Use of filters, cyclones, absorbents, and scrubbers may be necessary components of such a ventilation system. These are used to capture the contaminant in the exhausted air prior to venting the air to the outdoor environment or recirculating some or all of the air back into the work place.

Contact the Michigan Department of Environmental Quality (MDEQ), Clean Air Assistance Program, at 800-662-9278 prior to exhausting air to the outdoor environment. Permits may be required (see Chapter 1.2).

Additionally, consult ***MIOSHA General Industry Occupational Health Standards – Part 520, Ventilation Control (R 3101)*** prior to recirculating any air from exhaust systems back into the work place.



- Construct an enclosure around the employee or the process which uses the hazardous material or generates noise.

### 14.4 Administrative Controls and Personal Protective Equipment

If engineering controls do not reduce the exposures below the permissible exposure limit, you must rely on administrative controls and personal protective equipment (PPE) to reduce exposures.

Administrative controls are work practices or policies instituted by the employer to reduce employee exposure to air contaminants. Employee exposure to volatile organic compounds (VOCs) is significant in the printing industry. Minimizing evaporation of VOCs is key to controlling employee exposures. Many of the water and air pollution prevention strategies addressed in previous chapters are also effective controls for your employees' exposures to work place contaminants.

The last line of defense against airborne contaminants is PPE (see Chapter 12). This control measure is not considered as effective as engineering controls because the hazard still exists and you are relying on the employee to properly use the PPE to prevent exposure. Types of PPE include respirators, hearing protection, and chemical protective clothing. PPE should only be used to control exposures to contaminants (including noise):

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- When engineering or administrative controls are not available or feasible (or if these controls are installed but are not enough to reduce exposures below the personal exposure limit).
- During the time period that engineering controls are being installed.
- During emergencies.